

MERWIN, Jeffrey  
10/729, 068  
Attorney Docket No. 76288-88036

**REMARKS**

Examination is respectfully requested in view of the following remarks.

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**Disposition of Claims**

Claims 1-21 remain pending in the instant application. Specifically, claims 5-10 and 12-21 were provisionally elected in response to the Examiner's restriction requirement, while 10 claims 1-4 and 11 were withdrawn from consideration.

**Allowance of Claims**

The Applicant gratefully acknowledges the Examiner's indication that claims 8-10 are allowable over the prior art.

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**Drawings**

The Examiner is respectfully requested to acknowledge receipt of the corrected drawings filed concurrently with the preliminary amendment on August 9, 2005. In particular, the FIG. 20 2 was amended to change reference number 18 to correctly read 29 as recited in the specification. Accordingly, the Examiner is respectfully requested to approve the amendment to FIG. 2.

**Election of Claims**

25 Upon reviewing the claims withdrawn from consideration in the Examiner's Office Action Summary, the Applicant wishes to note that claim 21 was elected in his response to the Examiner's restriction requirement and that the Examiner's indication that claim 21 was withdrawn is incorrect. See page 12, lines 23-24, 30 Response to the Examiner's Restriction Requirement dated August 9, 2005. Based on the foregoing, the Examiner is respectfully

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requested to indicate the election for examination of claim 21 by the Applicant.

5 Formalities

The Examiner has rejected claims 12 and 15 under 35 USC 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the Applicant regards as the invention.

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Specifically, the terms "the water" in claim 12 and "the periodic signal" in claim 15 lack proper antecedent basis. In response, the Applicant has amended claim 12 to substitute the term "the water" with "the fluid" which provides proper antecedent basis to the claim language. The Applicant also has amended claim 15 to depend from claim 14, rather than claim 13, in order to recite that the signal introduced into the fluid-receiving space is of a periodic nature and provide proper antecedent basis to the term "the periodic signal". Accordingly, the Examiner is respectfully requested to withdraw his rejection of claims 12 and 15.

20 Objections

The Examiner has objected to claims 13-20 because the term "accord" should read "according". In response, the Applicant has amended claims 13-20 which substitutes the term "according" for "accord" as suggested by the Examiner. Based on the foregoing, the Examiner is respectfully requested to withdraw his objection to claims 13-20.

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Summary of Prior Art Rejections

The Examiner has rejected claims 5 and 7 under 35 USC 103(a) as being unpatentable over U.S. Patent No. 4,263,586 to John ("John") in view of U.S. Patent No. 5,546,009 to Raphael 5 ("Raphael"). In addition, the Examiner has rejected claims 12-14 and 17-20 under 35 USC 103(a) as being unpatentable over John in view of Raphael and further in view of U.S. Patent No. 6,688,329 to Murray et al. ("Murray").

10 Claimed Invention as Now Amended Is Patentable Over John In View  
Of Raphael

As noted above, the Examiner objected to dependent claim 6 as being dependent upon a rejected base claim (e.g. independent claim 5), while claim 7 was rejected as being unpatentable over 15 John in view of Raphael.

In response, the Applicant has rewritten claim 6 in independent form as well as incorporating the claim limitations of independent claim 5 in order to gain allowance of claim 6 and 20 overcome the Examiner's objection. Further, the Applicant has amended claim 7 to depend from newly independent claim 6, while canceling independent claim 5 without prejudice or disclaimer. As such, claim 7 should be considered allowable over John in view of Raphael by virtue of its dependency to independent claim 25 6.

Accordingly, the Examiner is respectfully requested to withdraw his objection to claim 6 as well as the prior art rejection of claim 7, and indicate the allowance thereof in view 30 of the above amendments and remarks.

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Claimed Invention Is Patentable Over John In View of Raphael In Further View Of Murray

As noted above, the Examiner rejected 12-14 and 17-20 as being unpatentable over John in view of Raphael and Murray.

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The Examiner asserts that the John reference discloses a method of introducing a signal into a fluid receiving space such that the signal is present for sensing within the fluid at a predetermined level. In addition, it is contended that John further discloses, *inter alia*, that the signal is transmitted through the fluid receiving space according to a value of electric conductivity of the fluid and that a probe is provided at the predetermined level for sensing the signal; sensing for the presence of the signal within the fluid at the predetermined level; and providing a control function in response to whether the signal is so sensed in order to indicate whether the fluid is or is not present while also establishing a delay on make and/or delay on break time for indicating that the fluid is lower than the predetermined level. However, the Examiner admits that the reference does not teach using a microprocessor to control the functions of the apparatus nor does the reference disclose selectively adjusting the sensitivity of the probe.

The Examiner contends that the Raphael reference discloses a method of sensing the presence or absence of a fluid at a predetermined level by detecting with a probe a signal transmitted through the fluid based on the electrical conductivity of the fluid, selectively adjusting the sensitivity of the probe-responsive circuitry of the fluid, and selectively adjusting the sensitivity of the probe-responsive circuitry according to the value of the fluid conductivity. According to

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the Examiner, it would have been obvious to one of ordinary skill in the art to combine the teachings of Raphael with the method of John because adjusting the sensitivity allows the apparatus to be used with a larger and more diverse array of 5 fluids while maintaining accurate measurements.

Finally, the Examiner asserts that the Murray reference discloses a method for determining whether a fluid is at a predetermined level in a fluid-receiving space in which a 10 microprocessor is used to control sensing and also control function including delay on make or delay on break operations. The Examiner concludes that it would have been obvious to combine the teachings of Murray with the method of John because it is well known that microprocessors allow for more accurate 15 and efficient operation of measurement processes.

A review of the John reference discloses a system for monitoring the liquid level in containers such as boilers and tanks. The reference further discloses a probe powered by 20 electrical AC current which is positioned at a low liquid level such that a probe energizing path may be traced to the liquid in the container which is sensed by the probe and provides an indication that there is liquid in the container. In addition, a delay circuit is provided in order to prevent nuisance shutdowns 25 caused by oscillating water contact between the ground and the probe. As such, a delay circuit is provided that holds an operating relay in over a predetermined delay period in order to recheck the water level and ensure that water is not contacting the probe.

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A review of the Raphael reference discloses a fluid detection system capable of detecting the smallest amount of liquid by detecting conductance when the liquid is subjected to very small amounts of electrical power in a small sampling area.

5 The fluid detection system includes an electronic control module and a sensing probe wherein the control module provides limited and controlled amounts of voltage and current to one or more remotely located probes. The voltage developed across the electrodes is entered into a comparator circuit and compared to  
10 a reference to produce a signal defining either a dry or a wet condition of the sensing probe.

Finally, a review of the Murray reference discloses a water feeder controller for a boiler that monitors a low water cut-off sensor in a boiler and uses a feed timer to feed water to the boiler for a predetermined period of time. The feed timer may be implemented by microprocessor and supplies water to the boiler only if the low water cutoff sensor continues to indicate a low water level for a delay period of time measured by a delay  
20 circuit.

In contrast, independent claim 12 recites a method of electronically determining whether fluid is at a predetermined level within a fluid-receiving space comprising introducing a  
25 signal into the fluid-receiving space such that the signal is present for sensing within fluid at a predetermined level; providing a probe at the predetermined level for sensing the signal; sensing for the presence of the signal within the fluid at the predetermined level; and selectively adjusting the  
30 sensitivity of the probe for sensing the presence of the signal in the fluid according to the value of electrical conductivity.

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In further contrast, claim 12 recites the limitation of providing a control function carried to determine either a delay on make or delay on break, or both a delay on make and delay on break, for an indication that fluid is lower than the predetermined level.

None of the cited prior art teach or suggest the limitation of low water cut-off system having a microprocessor that determines a delay on make operation wherein water must contact the sensing probe for a predetermined period of time before a signal is generated, thereby indicating that water is present in the boiler. In addition, the cited prior art does not teach nor suggest a delay on make operation in combination with a delay on break operation wherein the microprocessor may determine both a delay on make and a delay on break operations.

Although the John reference discloses a delay on break operation, the reference fails to teach or suggest a delay on make operation let alone a combination of delay on make and delay on break operations as presently claimed by the Applicant. In particular, John discloses that a 30 second retard system was developed to hold the operating relay in for that period while continuing to recheck the water level through the time cycle. The retard system disclosed in the John reference shuts down after the expiration of the period should the water level remain below the level of contact with the probe. See Col. 1, lines 62-68. However, there is no teaching or suggestion in the John reference that a delay on make operation may be implemented that delays the transmission of a signal indicating that water has

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contacted the probe until a predetermined period of time has expired.

In other words, the John reference only discloses a delay on break operation wherein the microprocessor permits a predetermined period of time to expire when fluid is not in contact with the probe in order to make a determination whether fluid no longer contacts the probe. In contrast, a delay on make operation, as claimed by the Applicants and recited in the specification, requires that the fluid be in contact with the probe for a predetermined period of time before a determination is made that fluid is actually present at the level of the probe. This delay on make operation is substantially different than the delay on break operation disclosed in the John reference since the determination for a delay on make operation is whether the fluid is contacting the probe over the predetermined period rather than not in contact with the probe. Accordingly, the John reference does not teach or suggest a delay on make operation, nor a delay on make operation in combination with a delay on break operation as presently recited in independent claim 12.

Similarly, the Murray reference simply discloses a water feeding system with a delay timer that permits the water feeding system to monitor the output of the low water cutoff over a predetermined period before making a determination whether a low water condition exists in the system which requires water to be fed into the boiler. See Col. 3, lines 47-57 and Col. 3, line 66 - Col. 4, line 7. Once a low water condition persists for at least the predetermined period, the micro-controller enables a water supply in fluid flow communication with the boiler to

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provide water to the boiler in order to raise the level of water in the boiler.

However, there is no teaching in the Murray reference that 5 would suggest a delay on make operation as presently recited in claim 12 wherein the micro-controller delays transmission of a signal indicating that water is in contact with the probe after a predetermined period of time has expired. Murray simply discloses a delay period by a water feeding system before 10 feeding water into a boiler in response to a low water indication by a low water cutoff. As such, Murray does not teach the limitation of determining that water is continuously in contact with the probe after a period of time has expired in accordance with a delay on make operation.

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Based on the foregoing, neither John, Raphael, nor Murray teach or suggest a method of electronically determining whether fluid is present at a predetermined level by providing a delay on make operation either alone or in combination with a delay on 20 break operation. Accordingly, the Examiner is respectfully requested to withdraw his rejection of independent claim 12 and indicate the allowance thereof. In addition, the Examiner is respectfully requested to withdraw his rejection of dependent claims 13, 14 and 17-20 by virtue of their respective 25 dependencies from independent claim 12 and indicate the allowance thereof.

**Elected Claim 21 Is Patentable Over the Cited Prior Art**

As noted above, independent claim 21 was provisionally 30 elected by the Applicant in his response dated September 9, 2005 to the Examiner's restriction requirement. Accordingly, the

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Examiner is respectfully requested to consider independent claim 21 in view of the cited prior art.

Independent claim 21 recites a method of probe monitoring 5 of liquid in a vessel by introducing a bipolar periodic signal to the vessel for being picked up by the probe and processing the sensed signal in at least a pair of separate signal paths for responding to respective different polarities of the bipolar signal such that signaling is a fail-safe operation. However, 10 neither John, Raphael, nor Murray teach nor suggest such a fail-safe operation as similarly recited in independent claims 8-10 which have been already allowed by the Examiner. Accordingly, the Examiner is respectfully requested to indicate the allowance of independent claim 21.

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#### CONCLUSION

By the present amendment and response, the Applicant has amended the claims and provided arguments in support of his position that the claimed invention directed to an 20 apparatus having control circuitry that provides multiple signal paths for responding to different polarities of a bipolar signal in a fail-safe operation and a related method of electronically determining whether fluid is at a predetermined level by a microprocessor control in order to 25 determine either a delay on make or delay on break time, or both, are patentable over the cited prior art. Based on the foregoing, the application is believed to be in a condition for allowance and expeditious notice thereof is earnestly solicited.

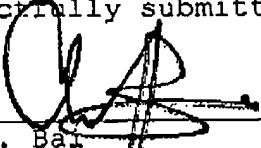
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The Examiner is requested to call the undersigned attorney  
collect if he has any questions related to the Applicants  
remarks and arguments traversing the Examiner's restriction  
requirement.

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Respectfully submitted,

  
3/24/2006

Date

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